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YANAI, Koji
TSUYUKI, Yumiko

<120> Surfactant tolerant cellulase and method for modification thereto

<130> Q95278

<150> PCT/JP2004/018184
<151> 2004-12-07

<150> JP 2003-409692
<151> 2003-12-08

<160> 48

<170> PatentIn version 3.1

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<223> Pyroglutamic acid

<220>
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<222> (16)..(870)
<223> Humicola insolens MN200-1

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tgc aag cct tcg tgc ggc tgg gcc aag aag gct ccc gtg aac cag cct 96
Cys Lys Pro Ser Cys Gly Trp Ala Lys Lys Ala Pro Val Asn Gln Pro
20 25 30
gtc ttc tcc tgc aac gcc aac ttc cag cgt ctc act gac ttc gac gcc 144
Val Phe Ser Cys Asn Ala Asn Phe Gln Arg Leu Thr Asp Phe Asp Ala
35 40 45
aag tcc ggc tgc gag ccg ggc ggt gtc gcc tac tcg tgc gcc gac cag 192
Lys Ser Gly Cys Glu Pro Gly Gly Val Ala Tyr Ser Cys Ala Asp Gln
50 55 60
acc cca tgg gct gtg aac gac gac ttc gcg ttc ggt ttt gct gcc acc 240

Thr 65	Pro	Trp	Ala	Val	Asn 70	Asp	Asp	Phe	Ala	Phe 75	Gly	Phe	Ala	Ala	Thr 80	
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ctc Leu	acc Thr	ttc Phe	aca Thr	tcc Ser	ggg Gly	cct Pro	gtt Val	gct Ala	ggc Gly	aag Lys	aag Lys	atg Met	gtc Val	gtc Val	cag Gln	336
tcc Ser	acc Thr	agc Ser	act Thr	ggc Gly	ggg Gly	gat Asp	ctt Leu	ggc Gly	agc Ser	aac Asn	cac His	ttc Phe	gat Asp	ctc Leu	aac Asn	384
atc Ile	ccc Pro	ggc Gly	ggc Gly	ggc Gly	gtc Val	ggc Gly	atc Ile	ttc Phe	gac Asp	gga Gly	tgc Cys	act Thr	ccc Pro	cag Gln	ttc Phe	432
ggc Gly	ggg Gly	ctg Leu	ccc Pro	ggc Gly	cag Gln	cgc Arg	tac Tyr	ggc Gly	ggc Gly	atc Ile	tgc Ser	tcc Ser	cgc Arg	aac Asn	gag Glu	480
tgc Cys	gat Asp	cgg Arg	ttc Phe	ccc Pro	gac Asp	gcc Ala	ctc Leu	aag Lys	ccc Pro	ggc Gly	tgc Cys	tac Tyr	tgg Trp	cgc Arg	ttc Phe	528
gac Asp	tgg Trp	ttc Phe	aag Lys	aac Asn	gcc Ala	gac Asp	aac Asn	ccg Pro	agc Ser	ttc Phe	agc Ser	ttc Phe	cgt Arg	cag Gln	gtc Val	576
caa Gln	tgc Cys	cca Pro	gcc Ala	gag Glu	ctc Leu	gtc Val	gct Ala	cgc Arg	acc Thr	gga Gly	tgc Cys	cgc Arg	cgc Arg	aac Asn	gac Asp	624
gac Asp	ggc Gly	aac Asn	ttc Phe	cct Pro	gcc Ala	gtc Val	cag Gln	atc Ile	ccc Pro	tcc Ser	agc Ser	agc Ser	acc Thr	agc Ser	tct Ser	672
ccg Pro	gtc Val	ggc Gly	cag Gln	cct Pro	acc Thr	agt Ser	acc Thr	agc Ser	acc Thr	acc Thr	tcc Ser	acc Thr	tcc Ser	acc Thr	acc Thr	720
tgc Ser	agc Ser	ccg Pro	ccc Pro	gtc Val	cag Gln	cct Pro	acg Thr	act Thr	ccc Pro	agc Ser	ggc Gly	tgc Cys	act Thr	gct Ala	gag Glu	768
agg Arg	tgg Trp	gct Ala	cag Gln	tgc Cys	ggc Gly	ggc Gly	aat Asn	ggc Gly	tgg Trp	agc Ser	ggc Gly	tgc Cys	acc Thr	acc Thr	tgc Cys	816
gtc Val	gct Ala	ggc Gly	agc Ser	acc Thr	tgc Cys	acg Thr	aag Lys	att Ile	aat Asn	gac Asp	tgg Trp	tac Tyr	cat His	cag Gln	tgc Cys	864
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Cys Lys Pro Ser Cys Gly Trp Ala Lys Lys Ala Pro Val Asn Gln Pro
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Val Phe Ser Cys Asn Ala Asn Phe Gln Arg Leu Thr Asp Phe Asp Ala
 35 40 45

Lys Ser Gly Cys Glu Pro Gly Gly Val Ala Tyr Ser Cys Ala Asp Gln
 50 55 60

Thr Pro Trp Ala Val Asn Asp Asp Phe Ala Phe Gly Phe Ala Ala Thr
 65 70 75 80

Ser Ile Ala Gly Ser Asn Glu Ala Gly Trp Cys Cys Ala Cys Tyr Glu
 85 90 95

Leu Thr Phe Thr Ser Gly Pro Val Ala Gly Lys Lys Met Val Val Gln
 100 105 110

Ser Thr Ser Thr Gly Gly Asp Leu Gly Ser Asn His Phe Asp Leu Asn
 115 120 125

Ile Pro Gly Gly Gly Val Gly Ile Phe Asp Gly Cys Thr Pro Gln Phe
 130 135 140

Gly Gly Leu Pro Gly Gln Arg Tyr Gly Gly Ile Ser Ser Arg Asn Glu
 145 150 155 160

Cys Asp Arg Phe Pro Asp Ala Leu Lys Pro Gly Cys Tyr Trp Arg Phe
 165 170 175

Asp Trp Phe Lys Asn Ala Asp Asn Pro Ser Phe Ser Phe Arg Gln Val
 180 185 190

Gln Cys Pro Ala Glu Leu Val Ala Arg Thr Gly Cys Arg Arg Asn Asp
 195 200 205

Asp Gly Asn Phe Pro Ala Val Gln Ile Pro Ser Ser Ser Thr Ser Ser
 210 215 220

Pro Val Gly Gln Pro Thr Ser Thr Ser Thr Thr Ser Thr Ser Thr Thr
 225 230 235 240

Ser Ser Pro Pro Val Gln Pro Thr Thr Pro Ser Gly Cys Thr Ala Glu
 245 250 255

Arg Trp Ala Gln Cys Gly Gly Asn Gly Trp Ser Gly Cys Thr Thr Cys
 260 265 270

Val Ala Gly Ser Thr Cys Thr Lys Ile Asn Asp Trp Tyr His Gln Cys
 275 280 285

Leu

<210> 3
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 <213> Staphylotrichum coccosporum IFO 31817

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 Pro Ser Cys Ser Trp Pro Gly Lys Ala Ser Val Asn Gln Pro Val Phe
 20 25 30

gcc tgc agc gcc aac ttc cag cgc atc agc gac ccc aac gtc aag tcg 144

Ala	Cys	Ser	Ala	Asn	Phe	Gln	Arg	Ile	Ser	Asp	Pro	Asn	Val	Lys	Ser	
		35					40					45				
ggc	tgc	gac	ggc	ggc	tcc	gcc	tac	gcc	tgc	gcc	gac	cag	acc	ccg	tgg	192
Gly	Cys	Asp	Gly	Gly	Ser	Ala	Tyr	Ala	Cys	Ala	Asp	Gln	Thr	Pro	Trp	
	50					55				60						
gcc	gtc	aac	gac	aac	ttc	tcg	tac	ggc	ttc	gcc	gcc	acg	tcc	atc	tcg	240
Ala	Val	Asn	Asp	Asn	Phe	Ser	Tyr	Gly	Phe	Ala	Ala	Thr	Ser	Ile	Ser	
65					70					75					80	
ggc	ggc	aac	gag	gcc	tcg	tgg	tgc	tgt	ggc	tgc	tac	gag	ctg	acc	ttc	288
Gly	Gly	Asn	Glu	Ala	Ser	Trp	Cys	Cys	Gly	Cys	Tyr	Glu	Leu	Thr	Phe	
				85					90					95		
acc	tcg	ggc	ccc	gtc	gct	ggc	aag	acc	atg	gtt	gtc	cag	tcc	acc	tcg	336
Thr	Ser	Gly	Pro	Val	Ala	Gly	Lys	Thr	Met	Val	Val	Gln	Ser	Thr	Ser	
			100					105					110			
acc	ggc	ggc	gac	ctc	ggc	acc	aac	cac	ttc	gac	ctg	gcc	atg	ccc	ggt	384
Thr	Gly	Gly	Asp	Leu	Gly	Thr	Asn	His	Phe	Asp	Leu	Ala	Met	Pro	Gly	
		115					120					125				
ggt	ggt	gtc	ggc	atc	ttc	gac	ggc	tgc	tcg	ccc	cag	ttc	ggc	ggc	ctc	432
Gly	Gly	Val	Gly	Ile	Phe	Asp	Gly	Cys	Ser	Pro	Gln	Phe	Gly	Gly	Leu	
	130					135					140					
gcc	ggc	gac	cgc	tac	ggc	ggc	gtc	tcg	tcg	cgc	agc	cag	tgc	gac	tcg	480
Ala	Gly	Asp	Arg	Tyr	Gly	Gly	Val	Ser	Ser	Arg	Ser	Gln	Cys	Asp	Ser	
145					150					155					160	
ttc	ccc	gcc	gcc	ctc	aag	ccc	ggc	tgc	tac	tgg	cgc	ttc	gac	tgg	ttc	528
Phe	Pro	Ala	Ala	Leu	Lys	Pro	Gly	Cys	Tyr	Trp	Arg	Phe	Asp	Trp	Phe	
				165					170					175		
aag	aac	gcc	gac	aac	ccg	acc	ttc	acc	ttc	cgc	cag	gtc	cag	tgc	ccg	576
Lys	Asn	Ala	Asp	Asn	Pro	Thr	Phe	Thr	Phe	Arg	Gln	Val	Gln	Cys	Pro	
			180					185					190			
tcg	gag	ctc	gtc	gcc	cgc	acc	ggc	tgc	cgc	cgc	aac	gac	gac	ggc	aac	624
Ser	Glu	Leu	Val	Ala	Arg	Thr	Gly	Cys	Arg	Arg	Asn	Asp	Asp	Gly	Asn	
		195					200					205				
ttc	ccc	gtc	ttc	acc	cct	ccc	tcg	ggc	ggt	cag	tcc	tcc	tcg	tct	tcc	672
Phe	Pro	Val	Phe	Thr	Pro	Pro	Ser	Gly	Gly	Gln	Ser	Ser	Ser	Ser	Ser	
	210					215					220					
tcc	tcc	agc	agc	gcc	aag	ccc	acc	tcc	acc	tcc	acc	tcg	acc	acc	tcc	720
Ser	Ser	Ser	Ser	Ala	Lys	Pro	Thr	Ser	Thr	Ser	Thr	Ser	Thr	Thr	Ser	
225					230					235					240	
acc	aag	gct	acc	tcc	acc	acc	tcg	acc	gcc	tcc	agc	cag	acc	tcg	tcg	768
Thr	Lys	Ala	Thr	Ser	Thr	Thr	Ser	Thr	Ala	Ser	Ser	Gln	Thr	Ser	Ser	
				245					250					255		
tcc	acc	ggc	ggc	ggc	tgc	gcc	gcc	cag	cgc	tgg	gcg	cag	tgc	ggc	ggc	816
Ser	Thr	Gly	Gly	Gly	Cys	Ala	Ala	Gln	Arg	Trp	Ala	Gln	Cys	Gly	Gly	
			260					265					270			
atc	ggg	ttc	tcg	ggc	tgc	acc	acg	tgc	gtc	agc	ggc	acc	acc	tgc	aac	864

Ile Gly Phe Ser Gly Cys Thr Thr Cys Val Ser Gly Thr Thr Cys Asn
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 Lys Gln Asn Asp Trp Tyr Ser Gln Cys Leu
 290 295

897

<210> 4
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 <213> Staphylotrichum coccosporum IFO 31817

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Ala Cys Ser Ala Asn Phe Gln Arg Ile Ser Asp Pro Asn Val Lys Ser
 35 40 45

Gly Cys Asp Gly Gly Ser Ala Tyr Ala Cys Ala Asp Gln Thr Pro Trp
 50 55 60

Ala Val Asn Asp Asn Phe Ser Tyr Gly Phe Ala Ala Thr Ser Ile Ser
 65 70 75 80

Gly Gly Asn Glu Ala Ser Trp Cys Cys Gly Cys Tyr Glu Leu Thr Phe
 85 90 95

Thr Ser Gly Pro Val Ala Gly Lys Thr Met Val Val Gln Ser Thr Ser
 100 105 110

Thr Gly Gly Asp Leu Gly Thr Asn His Phe Asp Leu Ala Met Pro Gly
 115 120 125

Gly Gly Val Gly Ile Phe Asp Gly Cys Ser Pro Gln Phe Gly Gly Leu
 130 135 140

Ala Gly Asp Arg Tyr Gly Gly Val Ser Ser Arg Ser Gln Cys Asp Ser
 145 150 155 160

Phe Pro Ala Ala Leu Lys Pro Gly Cys Tyr Trp Arg Phe Asp Trp Phe
 165 170 175

 Lys Asn Ala Asp Asn Pro Thr Phe Thr Phe Arg Gln Val Gln Cys Pro
 180 185 190

 Ser Glu Leu Val Ala Arg Thr Gly Cys Arg Arg Asn Asp Asp Gly Asn
 195 200 205

 Phe Pro Val Phe Thr Pro Pro Ser Gly Gly Gln Ser Ser Ser Ser Ser
 210 215 220

 Ser Ser Ser Ser Ala Lys Pro Thr Ser Thr Ser Thr Ser Thr Thr Ser
 225 230 235 240

 Thr Lys Ala Thr Ser Thr Thr Ser Thr Ala Ser Ser Gln Thr Ser Ser
 245 250 255

 Ser Thr Gly Gly Gly Cys Ala Ala Gln Arg Trp Ala Gln Cys Gly Gly
 260 265 270

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 275 280 285

 Lys Gln Asn Asp Trp Tyr Ser Gln Cys Leu
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tgc tcg tgg ccc ggc aag gcc tcg gtg aac cag ccc gtc ttc gcc tgc Cys Ser Trp Pro Gly Lys Ala Ser Val Asn Gln Pro Val Phe Ala Cys 20 25 30	156
agc gcc aac ttc cag cgc atc agc gac ccc aac gtc aag tcg ggc tgc Ser Ala Asn Phe Gln Arg Ile Ser Asp Pro Asn Val Lys Ser Gly Cys 35 40 45	204
gac ggc ggc tcc gcc tac gcc tgc gcc gac cag acc ccg tgg gcc gtc Asp Gly Gly Ser Ala Tyr Ala Cys Ala Asp Gln Thr Pro Trp Ala Val 50 55 60	252
aac gac aac ttc tcg tac ggc ttc gcc gcc acg tcc atc tcg ggc ggc Asn Asp Asn Phe Ser Tyr Gly Phe Ala Ala Thr Ser Ile Ser Gly Gly 65 70 75	300
aac gag gcc tcg tgg tgc tgt ggc tgc tac gag tgagtgttc ccccccccc Asn Glu Ala Ser Trp Cys Cys Gly Cys Tyr Glu 80 85 90	353
ccccccccac ccccggttcg gtcccttgcc gtgccttctt cataactaacc gcctaccccc	413
tccagg ctg acc ttc acc tcg ggc ccc gtc gct ggc aag acc atg gtt Leu Thr Phe Thr Ser Gly Pro Val Ala Gly Lys Thr Met Val 95 100	461
gtc cag tcc acc tcg acc ggc ggc gac ctc ggc acc aac cac ttc gac Val Gln Ser Thr Ser Thr Gly Gly Asp Leu Gly Thr Asn His Phe Asp 105 110 115 120	509
ctg gcc atg ccc ggt ggt ggt gtc ggc atc ttc gac ggc tgc tcg ccc Leu Ala Met Pro Gly Gly Gly Val Gly Ile Phe Asp Gly Cys Ser Pro 125 130 135	557
cag ttc ggc ggc ctc gcc ggc gac cgc tac ggc ggc gtc tcg tcg cgc Gln Phe Gly Gly Leu Ala Gly Asp Arg Tyr Gly Gly Val Ser Ser Arg 140 145 150	605
agc cag tgc gac tcg ttc ccc gcc gcc ctc aag ccc ggc tgc tac tgg Ser Gln Cys Asp Ser Phe Pro Ala Ala Leu Lys Pro Gly Cys Tyr Trp 155 160 165	653
cgc ttc gac tgg ttc aag aac gcc gac aac ccg acc ttc acc ttc cgc Arg Phe Asp Trp Phe Lys Asn Ala Asp Asn Pro Thr Phe Thr Phe Arg 170 175 180	701
cag gtc cag tgc ccg tcg gag ctc gtc gcc cgc acc ggc tgc cgc cgc Gln Val Gln Cys Pro Ser Glu Leu Val Ala Arg Thr Gly Cys Arg Arg 185 190 195 200	749
aac gac gac ggc aac ttc ccc gtc ttc acc cct ccc tcg ggc ggt cag Asn Asp Asp Gly Asn Phe Pro Val Phe Thr Pro Pro Ser Gly Gly Gln 205 210 215	797
tcc tcc tcg tct tcc tcc tcc agc agc gcc aag ccc acc tcc acc tcc	845

Ser	Ser	Ser	Ser	Ser	Ser	Ser	Ser	Ser	Ala	Lys	Pro	Thr	Ser	Thr	Ser		
			220					225					230				
acc	tgc	acc	acc	tcc	acc	aag	gct	acc	tcc	acc	acc	tgc	acc	gcc	tcc		893
Thr	Ser	Thr	Thr	Ser	Thr	Lys	Ala	Thr	Ser	Thr	Thr	Ser	Thr	Ala	Ser		
			235				240						245				
agc	cag	acc	tgc	tgc	tcc	acc	ggc	ggc	ggc	tgc	gcc	gcc	cag	cgc	tgg		941
Ser	Gln	Thr	Ser	Ser	Ser	Thr	Gly	Gly	Gly	Cys	Ala	Ala	Gln	Arg	Trp		
			250				255					260					
gcg	cag	tgc	ggc	ggc	atc	ggg	ttc	tgc	ggc	tgc	acc	acg	tgc	gtc	agc		989
Ala	Gln	Cys	Gly	Gly	Ile	Gly	Phe	Ser	Gly	Cys	Thr	Thr	Cys	Val	Ser		
						270					275				280		
ggc	acc	acc	tgc	aac	aag	cag	aac	gac	tgg	tac	tgc	cag	tgc	ctt	tga		1037
Gly	Thr	Thr	Cys	Asn	Lys	Gln	Asn	Asp	Trp	Tyr	Ser	Gln	Cys	Leu			
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<210> 7
 <211> 35
 <212> DNA
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<210> 8
 <211> 36
 <212> DNA
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 gccgcccagc aggcgggatc cctcaccacc gagagg 36

<210> 9
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 <212> DNA
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 <223> Chemcially synthesized Primer MKA-06
 <400> 9
 tgatcgtcga gtcagggatc cagaatttac aggcac 36

<210> 10
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<210> 11
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 <222> (1)..(1)
 <223> PYRROLIDONE CARBOXYLIC ACID

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 1 5 10

<210> 12
 <211> 53
 <212> DNA
 <213> Artificial Sequence

<220>
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<210> 13
<211> 44
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44

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<210> 15
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37

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<212> DNA
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32

<210> 17
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<213> Artificial Sequence

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ccggtgttgg ccggatccgc tgatggcaag 30

<210> 18
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<220>
<223> Chemcially synthesized Primer NCE4-Cs

<400> 18
taaggccctc aaggatccct gcgtctacag 30

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<400> 19

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<210> 20
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<222> (1)..(1)
<223> PYRROLIDONE CARBOXYLIC ACID

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<222> (1)..(5)

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<210> 21
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<212> DNA
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 <210> 22
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 <400> 23
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 <211> 23
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 <220>
 <223> Chemcially synthesized Primer CB1-Bam

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 <210> 25
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 <220>
 <223> Chemcially synthesized Primer CB1-Pst

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 <210> 26

<211> 66
 <212> DNA
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 <220>
 <223> Chemcially synthesized pCB1-M2

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 gctact 66

 <210> 27
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 <220>
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 Met Tyr Gln Lys Leu Ala Leu Ile Ser Ala Phe Leu Ala Thr
 1 5 10

 <210> 28
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Ala Arg Ala Gln Ser Ala Cys Thr Gln Cys Leu Gln
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<220>

<223> Chemcially synthesized Primer STCE1-TCET22I

<400> 31

gggatgcatt taaaggcact gcgagtacca gtc

33

<210> 32

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> Chemcially synthesized Primer STCE1-TmNSph

<400> 32

ggggcatgcg atggcaagtc gacccgctac

30

<210> 33

<211> 7

<212> PRT

<213> Staphylotrichum coccosporum IFO 31817

<400> 33

Ala Asp Gly Lys Ser Thr Arg

1

5

<210> 34

<211> 10

<212> PRT

<213> Staphylotrichum coccosporum IFO 31817

<220>

<221> MOD_RES

<222> (1)..(1)
<223> PYRROLIDONE CARBOXYLIC ACID

<220>
<221> MUTAGEN
<222> (1)..(4)

<400> 34

Gln Ser Ala Cys Asp Gly Lys Ser Thr Arg
1 5 10

<210> 35
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Chemcially synthesized Primer STCE1-TmNSma

<400> 35
ggccccgggct caggccgatg gcaagtcgac ccg 33

<210> 36
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Chemcially synthesized Primer STCE1-TmNSph-2

<400> 36
gggcatgcgc cgatggcaag tcgacccgc 29

<210> 37
<211> 891
<212> DNA
<213> Staphylotrichum coccosporum IFO 31817

<220>
<221> CDS
<222> (1)..(891)

<220>
<221> misc_feature
<222> (1)..(3)
<223> Pyroglutamic acid

<220>
<221> source
<222> (4)..(891)
<223> Staphylotrichum coccosporum IFO 31817

<400> 37

cag gcc gat ggc aag tcc acc cgc tac tgg gac tgc tgc aag cct tcg	48
Gln Ala Asp Gly Lys Ser Thr Arg Tyr Trp Asp Cys Cys Lys Pro Ser	
1 5 10 15	
tgc tcg tgg ccc ggc aag gcc tcg gtg aac cag ccc gtc ttc gcc tgc	96
Cys Ser Trp Pro Gly Lys Ala Ser Val Asn Gln Pro Val Phe Ala Cys	
20 25 30	
agc gcc aac ttc cag cgc atc agc gac ccc aac gtc aag tcg ggc tgc	144
Ser Ala Asn Phe Gln Arg Ile Ser Asp Pro Asn Val Lys Ser Gly Cys	
35 40 45	
gac ggc ggc tcc gcc tac gcc tgc gcc gac cag acc ccg tgg gcc gtc	192
Asp Gly Gly Ser Ala Tyr Ala Cys Ala Asp Gln Thr Pro Trp Ala Val	
50 55 60	
aac gac aac ttc tcg tac ggc ttc gcc gcc acg tcc atc tcg ggc ggc	240
Asn Asp Asn Phe Ser Tyr Gly Phe Ala Ala Thr Ser Ile Ser Gly Gly	
65 70 75 80	
aac gag gcc tcg tgg tgc tgt ggc tgc tac gag ctg acc ttc acc tcg	288
Asn Glu Ala Ser Trp Cys Cys Gly Cys Tyr Glu Leu Thr Phe Thr Ser	
85 90 95	
ggc ccc gtc gct ggc aag acc atg gtt gtc cag tcc acc tcg acc ggc	336
Gly Pro Val Ala Gly Lys Thr Met Val Val Gln Ser Thr Ser Thr Gly	
100 105 110	
ggc gac ctc ggc acc aac cac ttc gac ctg gcc atg ccc ggt ggt ggt	384
Gly Asp Leu Gly Thr Asn His Phe Asp Leu Ala Met Pro Gly Gly Gly	
115 120 125	
gtc ggc atc ttc gac ggc tgc tcg ccc cag ttc ggc ggc ctc gcc ggc	432
Val Gly Ile Phe Asp Gly Cys Ser Pro Gln Phe Gly Gly Leu Ala Gly	
130 135 140	
gac cgc tac ggc ggc gtc tcg tcg cgc agc cag tgc gac tcg ttc ccc	480
Asp Arg Tyr Gly Gly Val Ser Ser Arg Ser Gln Cys Asp Ser Phe Pro	
145 150 155 160	
gcc gcc ctc aag ccc ggc tgc tac tgg cgc ttc gac tgg ttc aag aac	528
Ala Ala Leu Lys Pro Gly Cys Tyr Trp Arg Phe Asp Trp Phe Lys Asn	
165 170 175	
gcc gac aac ccg acc ttc acc ttc cgc cag gtc cag tgc ccg tcg gag	576
Ala Asp Asn Pro Thr Phe Thr Phe Arg Gln Val Gln Cys Pro Ser Glu	
180 185 190	
ctc gtc gcc cgc acc ggc tgc cgc cgc aac gac gac ggc aac ttc ccc	624
Leu Val Ala Arg Thr Gly Cys Arg Arg Asn Asp Asp Gly Asn Phe Pro	
195 200 205	
gtc ttc acc cct ccc tcg ggc ggt cag tcc tcc tcg tct tcc tcc tcc	672
Val Phe Thr Pro Pro Ser Gly Gly Gln Ser Ser Ser Ser Ser Ser	
210 215 220	
agc agc gcc aag ccc acc tcc acc tcc acc tcg acc acc tcc acc aag	720
Ser Ser Ala Lys Pro Thr Ser Thr Ser Thr Ser Thr Thr Ser Thr Lys	
225 230 235 240	

gct acc tcc acc acc tcg acc gcc tcc agc cag acc tcg tcg tcc acc 768
 Ala Thr Ser Thr Thr Ser Thr Ala Ser Ser Gln Thr Ser Ser Ser Thr
 245 250 255

ggc ggc ggc tgc gcc gcc cag cgc tgg gcg cag tgc ggc ggc atc ggg 816
 Gly Gly Gly Cys Ala Ala Gln Arg Trp Ala Gln Cys Gly Gly Ile Gly
 260 265 270

ttc tcg ggc tgc acc acg tgc gtc agc ggc acc acc tgc aac aag cag 864
 Phe Ser Gly Cys Thr Thr Cys Val Ser Gly Thr Thr Cys Asn Lys Gln
 275 280 285

aac gac tgg tac tcg cag tgc ctt taa 891
 Asn Asp Trp Tyr Ser Gln Cys Leu
 290 295

<210> 38
 <211> 296
 <212> PRT
 <213> Staphylotrichum coccosporum IFO 31817

<220>
 <221> misc_feature
 <222> (1)..(3)
 <223> Pyroglutamic acid

<400> 38

Gln Ala Asp Gly Lys Ser Thr Arg Tyr Trp Asp Cys Cys Lys Pro Ser
 1 5 10 15

Cys Ser Trp Pro Gly Lys Ala Ser Val Asn Gln Pro Val Phe Ala Cys
 20 25 30

Ser Ala Asn Phe Gln Arg Ile Ser Asp Pro Asn Val Lys Ser Gly Cys
 35 40 45

Asp Gly Gly Ser Ala Tyr Ala Cys Ala Asp Gln Thr Pro Trp Ala Val
 50 55 60

Asn Asp Asn Phe Ser Tyr Gly Phe Ala Ala Thr Ser Ile Ser Gly Gly
 65 70 75 80

Asn Glu Ala Ser Trp Cys Cys Gly Cys Tyr Glu Leu Thr Phe Thr Ser
 85 90 95

Gly Pro Val Ala Gly Lys Thr Met Val Val Gln Ser Thr Ser Thr Gly
 100 105 110

Gly Asp Leu Gly Thr Asn His Phe Asp Leu Ala Met Pro Gly Gly Gly
 115 120 125

Val Gly Ile Phe Asp Gly Cys Ser Pro Gln Phe Gly Gly Leu Ala Gly
 130 135 140

Asp Arg Tyr Gly Gly Val Ser Ser Arg Ser Gln Cys Asp Ser Phe Pro
 145 150 155 160

Ala Ala Leu Lys Pro Gly Cys Tyr Trp Arg Phe Asp Trp Phe Lys Asn
 165 170 175

Ala Asp Asn Pro Thr Phe Thr Phe Arg Gln Val Gln Cys Pro Ser Glu
 180 185 190

Leu Val Ala Arg Thr Gly Cys Arg Arg Asn Asp Asp Gly Asn Phe Pro
 195 200 205

Val Phe Thr Pro Pro Ser Gly Gly Gln Ser Ser Ser Ser Ser Ser Ser
 210 215 220

Ser Ser Ala Lys Pro Thr Ser Thr Ser Thr Ser Thr Thr Ser Thr Lys
 225 230 235 240

Ala Thr Ser Thr Thr Ser Thr Ala Ser Ser Gln Thr Ser Ser Ser Thr
 245 250 255

Gly Gly Gly Cys Ala Ala Gln Arg Trp Ala Gln Cys Gly Gly Ile Gly
 260 265 270

Phe Ser Gly Cys Thr Thr Cys Val Ser Gly Thr Thr Cys Asn Lys Gln
 275 280 285

Asn Asp Trp Tyr Ser Gln Cys Leu
 290 295

<210> 39
 <211> 900
 <212> DNA
 <213> Staphylotrichum coccosporum IFO 31817

<220>
 <221> CDS
 <222> (1)..(900)

<220>
 <221> source
 <222> (13)..(900)
 <223> Pyroglutamic acid

<220>
 <221> misc_feature
 <222> (1)..(3)
 <223> Pyroglutamic acid

<400> 39
 cag tcg gca tgc gcc gat ggc aag tcc acc cgc tac tgg gac tgc tgc 48
 Gln Ser Ala Cys Ala Asp Gly Lys Ser Thr Arg Tyr Trp Asp Cys Cys
 1 5 10 15
 aag cct tcg tgc tcg tgg ccc ggc aag gcc tcg gtg aac cag ccc gtc 96
 Lys Pro Ser Cys Ser Trp Pro Gly Lys Ala Ser Val Asn Gln Pro Val
 20 25 30
 ttc gcc tgc agc gcc aac ttc cag cgc atc agc gac ccc aac gtc aag 144
 Phe Ala Cys Ser Ala Asn Phe Gln Arg Ile Ser Asp Pro Asn Val Lys
 35 40 45
 tcg ggc tgc gac ggc ggc tcc gcc tac gcc tgc gcc gac cag acc ccg 192
 Ser Gly Cys Asp Gly Gly Ser Ala Tyr Ala Cys Ala Asp Gln Thr Pro
 50 55 60
 tgg gcc gtc aac gac aac ttc tcg tac ggc ttc gcc gcc acg tcc atc 240
 Trp Ala Val Asn Asp Asn Phe Ser Tyr Gly Phe Ala Ala Thr Ser Ile
 65 70 75 80
 tcg ggc ggc aac gag gcc tcg tgg tgc tgt ggc tgc tac gag ctg acc 288
 Ser Gly Gly Asn Glu Ala Ser Trp Cys Cys Gly Cys Tyr Glu Leu Thr
 85 90 95
 ttc acc tcg ggc ccc gtc gct ggc aag acc atg gtt gtc cag tcc acc 336
 Phe Thr Ser Gly Pro Val Ala Gly Lys Thr Met Val Val Gln Ser Thr
 100 105 110
 tcg acc ggc ggc gac ctc ggc acc aac cac ttc gac ctg gcc atg ccc 384
 Ser Thr Gly Gly Asp Leu Gly Thr Asn His Phe Asp Leu Ala Met Pro
 115 120 125
 ggt ggt ggt gtc ggc atc ttc gac ggc tgc tcg ccc cag ttc ggc ggc 432
 Gly Gly Gly Val Gly Ile Phe Asp Gly Cys Ser Pro Gln Phe Gly Gly
 130 135 140
 ctc gcc ggc gac cgc tac ggc ggc gtc tcg tcg cgc agc cag tgc gac 480
 Leu Ala Gly Asp Arg Tyr Gly Gly Val Ser Ser Arg Ser Gln Cys Asp
 145 150 155 160
 tcg ttc ccc gcc gcc ctc aag ccc ggc tgc tac tgg cgc ttc gac tgg 528
 Ser Phe Pro Ala Ala Leu Lys Pro Gly Cys Tyr Trp Arg Phe Asp Trp
 165 170 175
 ttc aag aac gcc gac aac ccg acc ttc acc ttc cgc cag gtc cag tgc 576
 Phe Lys Asn Ala Asp Asn Pro Thr Phe Thr Phe Arg Gln Val Gln Cys
 180 185 190
 ccg tcg gag ctc gtc gcc cgc acc ggc tgc cgc cgc aac gac gac ggc 624
 Pro Ser Glu Leu Val Ala Arg Thr Gly Cys Arg Arg Asn Asp Asp Gly
 195 200 205

aac ttc ccc gtc ttc acc cct ccc tcg ggc ggt cag tcc tcc tcg tct 672
 Asn Phe Pro Val Phe Thr Pro Pro Ser Gly Gly Gln Ser Ser Ser Ser
 210 215 220

tcc tcc tcc agc agc gcc aag ccc acc tcc acc tcc acc tcg acc acc 720
 Ser Ser Ser Ser Ser Ala Lys Pro Thr Ser Thr Ser Thr Ser Thr Thr
 225 230 235 240

tcc acc aag gct acc tcc acc acc tcg acc gcc tcc agc cag acc tcg 768
 Ser Thr Lys Ala Thr Ser Thr Thr Ser Thr Ala Ser Ser Gln Thr Ser
 245 250 255

tcg tcc acc ggc ggc ggc tgc gcc gcc cag cgc tgg gcg cag tgc ggc 816
 Ser Ser Thr Gly Gly Gly Cys Ala Ala Gln Arg Trp Ala Gln Cys Gly
 260 265 270

ggc atc ggg ttc tcg ggc tgc acc acg tgc gtc agc ggc acc acc tgc 864
 Gly Ile Gly Phe Ser Gly Cys Thr Thr Cys Val Ser Gly Thr Thr Cys
 275 280 285

aac aag cag aac gac tgg tac tcg cag tgc ctt taa 900
 Asn Lys Gln Asn Asp Trp Tyr Ser Gln Cys Leu
 290 295

<210> 40
 <211> 299
 <212> PRT
 <213> Staphylotrichum coccosporum IFO 31817

<220>
 <221> misc_feature
 <222> (1)..(3)
 <223> Pyroglutamic acid

<400> 40

Gln Ser Ala Cys Ala Asp Gly Lys Ser Thr Arg Tyr Trp Asp Cys Cys
 1 5 10 15

Lys Pro Ser Cys Ser Trp Pro Gly Lys Ala Ser Val Asn Gln Pro Val
 20 25 30

Phe Ala Cys Ser Ala Asn Phe Gln Arg Ile Ser Asp Pro Asn Val Lys
 35 40 45

Ser Gly Cys Asp Gly Gly Ser Ala Tyr Ala Cys Ala Asp Gln Thr Pro
 50 55 60

Trp Ala Val Asn Asp Asn Phe Ser Tyr Gly Phe Ala Ala Thr Ser Ile
 65 70 75 80

Ser Gly Gly Asn Glu Ala Ser Trp Cys Cys Gly Cys Tyr Glu Leu Thr
 85 90 95

Phe Thr Ser Gly Pro Val Ala Gly Lys Thr Met Val Val Gln Ser Thr
100 105 110

Ser Thr Gly Gly Asp Leu Gly Thr Asn His Phe Asp Leu Ala Met Pro
115 120 125

Gly Gly Gly Val Gly Ile Phe Asp Gly Cys Ser Pro Gln Phe Gly Gly
130 135 140

Leu Ala Gly Asp Arg Tyr Gly Gly Val Ser Ser Arg Ser Gln Cys Asp
145 150 155 160

Ser Phe Pro Ala Ala Leu Lys Pro Gly Cys Tyr Trp Arg Phe Asp Trp
165 170 175

Phe Lys Asn Ala Asp Asn Pro Thr Phe Thr Phe Arg Gln Val Gln Cys
180 185 190

Pro Ser Glu Leu Val Ala Arg Thr Gly Cys Arg Arg Asn Asp Asp Gly
195 200 205

Asn Phe Pro Val Phe Thr Pro Pro Ser Gly Gly Gln Ser Ser Ser Ser
210 215 220

Ser Ser Ser Ser Ser Ala Lys Pro Thr Ser Thr Ser Thr Ser Thr Thr
225 230 235 240

Ser Thr Lys Ala Thr Ser Thr Thr Ser Thr Ala Ser Ser Gln Thr Ser
245 250 255

Ser Ser Thr Gly Gly Gly Cys Ala Ala Gln Arg Trp Ala Gln Cys Gly
260 265 270

Gly Ile Gly Phe Ser Gly Cys Thr Thr Cys Val Ser Gly Thr Thr Cys
275 280 285

Asn Lys Gln Asn Asp Trp Tyr Ser Gln Cys Leu
290 295

<210> 41

<211> 8

<212> PRT

<213> Staphylotrichum coccosporum IFO 31817

<220>

<221> MOD_RES
<222> (1)..(1)
<223> PYRROLIDONE CARBOXYLIC ACID

<220>
<221> MUTAGEN
<222> (1)..(1)

<400> 41

Gln Ala Asp Gly Lys Ser Thr Arg
1 5

<210> 42
<211> 11
<212> PRT
<213> Staphylotrichum coccosporum IFO 31817

<220>
<221> MOD_RES
<222> (1)..(1)
<223> PYRROLIDONE CARBOXYLIC ACID

<220>
<221> MUTAGEN
<222> (1)..(4)

<400> 42

Gln Ser Ala Cys Ala Asp Gly Lys Ser Thr Arg
1 5 10

<210> 43
<211> 21
<212> PRT
<213> Staphylotrichum coccosporum IFO 31817

<400> 43

Met Arg Ser Ser Pro Val Leu Arg Thr Ala Leu Ala Ala Ala Leu Pro
1 5 10 15

Leu Ala Ala Leu Ala
20

<210> 44
<211> 295
<212> PRT
<213> Staphylotrichum coccosporum IFO 31817

<400> 44

Ala	Asp	Gly	Lys	Ser	Thr	Arg	Tyr	Trp	Asp	Cys	Cys	Lys	Pro	Ser	Cys	
1				5					10					15		
Ser	Trp	Pro	Gly	Lys	Ala	Ser	Val	Asn	Gln	Pro	Val	Phe	Ala	Cys	Ser	
			20					25					30			
Ala	Asn	Phe	Gln	Arg	Ile	Ser	Asp	Pro	Asn	Val	Lys	Ser	Gly	Cys	Asp	
		35					40					45				
Gly	Gly	Ser	Ala	Tyr	Ala	Cys	Ala	Asp	Gln	Thr	Pro	Trp	Ala	Val	Asn	
	50					55					60					
Asp	Asn	Phe	Ser	Tyr	Gly	Phe	Ala	Ala	Thr	Ser	Ile	Ser	Gly	Gly	Asn	
65					70					75					80	
Glu	Ala	Ser	Trp	Cys	Cys	Gly	Cys	Tyr	Glu	Leu	Thr	Phe	Thr	Ser	Gly	
				85					90					95		
Pro	Val	Ala	Gly	Lys	Thr	Met	Val	Val	Gln	Ser	Thr	Ser	Thr	Gly	Gly	
			100					105						110		
Asp	Leu	Gly	Thr	Asn	His	Phe	Asp	Leu	Ala	Met	Pro	Gly	Gly	Gly	Val	
		115					120					125				
Gly	Ile	Phe	Asp	Gly	Cys	Ser	Pro	Gln	Phe	Gly	Gly	Leu	Ala	Gly	Asp	
	130					135					140					
Arg	Tyr	Gly	Gly	Val	Ser	Ser	Arg	Ser	Gln	Cys	Asp	Ser	Phe	Pro	Ala	
145					150					155					160	
Ala	Leu	Lys	Pro	Gly	Cys	Tyr	Trp	Arg	Phe	Asp	Trp	Phe	Lys	Asn	Ala	
				165					170					175		
Asp	Asn	Pro	Thr	Phe	Thr	Phe	Arg	Gln	Val	Gln	Cys	Pro	Ser	Glu	Leu	
			180					185					190			
Val	Ala	Arg	Thr	Gly	Cys	Arg	Arg	Asn	Asp	Asp	Gly	Asn	Phe	Pro	Val	
		195					200					205				
Phe	Thr	Pro	Pro	Ser	Gly	Gly	Gln	Ser	Ser	Ser	Ser	Ser	Ser	Ser	Ser	
	210					215					220					
Ser	Ala	Lys	Pro	Thr	Ser	Thr	Ser	Thr	Ser	Thr	Thr	Ser	Thr	Lys	Ala	
225					230					235					240	

Thr Ser Thr Thr Ser Thr Ala Ser Ser Gln Thr Ser Ser Ser Thr Gly
245 250 255

Gly Gly Cys Ala Ala Gln Arg Trp Ala Gln Cys Gly Gly Ile Gly Phe
260 265 270

Ser Gly Cys Thr Thr Cys Val Ser Gly Thr Thr Cys Asn Lys Gln Asn
275 280 285

Asp Trp Tyr Ser Gln Cys Leu
290 295

<210> 45
<211> 20
<212> PRT
<213> Humicola insolens

<400> 45

Met Arg Ser Ser Pro Leu Leu Arg Ser Ala Val Val Ala Ala Leu Pro
1 5 10 15

Val Leu Ala Leu
20

<210> 46
<211> 286
<212> PRT
<213> Humicola insolens

<400> 46

Ala Ala Asp Gly Lys Ser Thr Arg Tyr Trp Asp Cys Cys Lys Pro Ser
1 5 10 15

Cys Gly Trp Ala Lys Lys Ala Pro Val Asn Gln Pro Val Phe Ser Cys
20 25 30

Asn Ala Asn Phe Gln Arg Leu Thr Asp Phe Asp Ala Lys Ser Gly Cys
35 40 45

Glu Pro Gly Gly Val Ala Tyr Ser Cys Ala Asp Gln Thr Pro Trp Ala
50 55 60

Val Asn Asp Asp Phe Ala Phe Gly Phe Ala Ala Thr Ser Ile Ala Gly
65 70 75 80

Ser Asn Glu Ala Gly Trp Cys Cys Ala Cys Tyr Glu Leu Thr Phe Thr
85 90 95

Ser Gly Pro Val Ala Gly Lys Lys Met Val Val Gln Ser Thr Ser Thr
100 105 110

Gly Gly Asp Leu Gly Ser Asn His Phe Asp Leu Asn Ile Pro Gly Gly
115 120 125

Gly Val Gly Ile Phe Asp Gly Cys Thr Pro Gln Phe Gly Gly Leu Pro
130 135 140

Gly Gln Arg Tyr Gly Gly Ile Ser Ser Arg Asn Glu Cys Asp Arg Phe
145 150 155 160

Pro Asp Ala Leu Lys Pro Gly Cys Tyr Trp Arg Phe Asp Trp Phe Lys
165 170 175

Asn Ala Asp Asn Pro Ser Phe Ser Phe Arg Gln Val Gln Cys Pro Ala
180 185 190

Glu Leu Val Ala Arg Thr Gly Cys Arg Arg Asn Asp Asp Gly Asn Phe
195 200 205

Pro Ala Val Gln Ile Pro Ser Ser Ser Thr Ser Ser Pro Val Gly Gln
210 215 220

Pro Thr Ser Thr Ser Thr Thr Ser Thr Ser Thr Thr Ser Ser Pro Pro
225 230 235 240

Val Gln Pro Thr Thr Pro Ser Gly Cys Thr Ala Glu Arg Trp Ala Cys
245 250 255

Gln Cys Gly Gly Asn Gly Trp Ser Gly Cys Thr Thr Cys Val Ala Gly
260 265 270

Ser Thr Cys Thr Lys Ile Asn Asp Trp Tyr His Gln Cys Leu
275 280 285

<210> 47

<211> 17

<212> PRT

<213> Humicola insolens

<400> 47

Met Gln Leu Pro Leu Thr Thr Leu Leu Thr Leu Leu Pro Ala Leu Ala
1 5 10 15

Ala

<210> 48
<211> 206
<212> PRT
<213> Humicola insolens

<400> 48

Ala Gln Ser Gly Ser Gly Arg Thr Thr Arg Tyr Trp Asp Cys Cys Lys
1 5 10 15

Pro Ser Cys Ala Trp Pro Gly Lys Gly Pro Ala Pro Val Arg Thr Cys
20 25 30

Asp Arg Trp Asp Asn Pro Leu Phe Asp Gly Gly Asn Thr Arg Ser Gly
35 40 45

Cys Asp Ala Gly Gly Gly Ala Tyr Met Cys Ser Asp Gln Ser Pro Trp
50 55 60

Ala Val Ser Asp Asp Leu Ala Tyr Gly Trp Ala Ala Val Asn Ile Ala
65 70 75 80

Gly Ser Asn Glu Arg Gln Trp Cys Cys Ala Cys Tyr Glu Leu Thr Phe
85 90 95

Thr Ser Gly Pro Val Ala Gly Lys Arg Met Ile Val Gln Ala Ser Asn
100 105 110

Thr Gly Gly Asp Leu Gly Asn Asn His Phe Asp Ile Ala Met Pro Gly
115 120 125

Gly Gly Val Gly Ile Phe Asn Ala Cys Thr Asp Gln Tyr Gly Ala Pro
130 135 140

Pro Asn Gly Trp Gly Gln Arg Tyr Gly Gly Ile Ser Gln Arg His Glu
145 150 155 160

Cys Asp Ala Phe Pro Glu Lys Leu Lys Pro Gly Cys Tyr Trp Arg Phe
165 170 175

Asp Trp Phe Leu Asn Ala Asp Asn Pro Ser Val Asn Trp Arg Gln Val
180 185 190

Ser Cys Pro Ala Glu Ile Val Ala Lys Ser Gly Cys Ser Arg
195 200 205